

Application Serial No. 10/550,577
Reply to Office Action of August 4, 2008

PATENT
Docket: CU-6554

REMARKS

In the Office Action, dated August 4, 2008, the Examiner states that Claims 1-40 are pending, Claims 3-18 and 33-40 are withdrawn, and Claims 1, 2 and 19-32 are rejected. By the present Amendment, Applicant amends the claims and the drawings.

Drawing Figures

Drawing Figures 1 and 2 are objected to because the Office Action considers that they should be labeled as "Prior art." Applicant has amended these drawing figures accordingly. As such, Applicant respectfully requests withdrawal of the present objection to drawing Figures 1 and 2.

Claim Objections

The claims are objected to because they should be identified as amended using status identifiers. Applicant has labeled each and every claim with a status identifier. As such, Applicant respectfully requests withdrawal of the present objection to the claims.

Claim Rejections under 35 U.S.C. 112

The claims are rejected because the Office Actions considers that they do not recite that the photocurable functional group can be an ethylenically unsaturated group. Applicant has amended Claim 21 to recite that the photocurable functional group other than the cyclic imide group of the copolymer (a1) is an ethylenically unsaturated bond. Applicant has also amended Claim 1 to recite that the photocurable functional groups of the photocurable compound (c) are photoradical polymerizing functional groups.

Next, the Office Action rejected the claims because the phrase "are linked at least" is considered ambiguous. Applicant has rearranged this claim in order to make it more clear that copolymer (a) has a molecular structure including, at a minimum, a unit including an acidic functional group linked to a unit including a photocurable functional group.

The Office Action also rejected the claims because the definition of the phrase "photocurable groups" does not set forth what kind of photocurable groups are suitable or if more than one kind of photocurable group is present. Applicant has amended Claim 21 to recite that the photocurable functional group other than the cyclic imide group of the copolymer (a1) is an ethylenically unsaturated bond.

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Applicant has also amended Claim 1 to recite that the photocurable functional groups of the photocurable compound (c) are photoradical polymerizing functional groups. There may be more than one photocurable functional group in a molecule, the groups may be the same type or two or more different types, and the photocurable functional group of copolymer (a) and compound (c) may be the same (see page 58, line 26 – page 59, line 3, and page 127, lines 13-24 of the specification).

Further, the Office Action does not consider it to be clear whether the phrase [(elastic deformation amount / total deformation amount) X 100] of Claims 24 and 31 is meant to be a positive recitation in the claims. The claim has been rearranged to clearly recite that this phrase is the definition of elastic deformation modulus.

Rejections under 35 U.S.C. 103(a)

Claims 1 and 2 are rejected under 35 U.S.C. 103(a) as unpatentable over Ueda et al. (US 6,410,206) in view of Sakurai et al. (US 6,013,415). Claims 1, 2 and 19-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 2002-116538 in view of Sakurai et al. Claims 1, 2 and 19-32 are rejected as being unpatentable over Sakurai et al. in view of Okazaki et al. (WO 01/72858) or over Hayashi et al. (US 7,399,574) in view of Sakurai et al. Applicant respectfully disagrees with and traverses these rejections.

Applicant respectfully asserts that the amended claims differentiate the present invention from Ueda et al. Specifically, the copolymer (a) of the present invention is clearly different from the photocurable copolymer resin of Ueda et al. by incorporating an imide ring structure into the copolymer (a).

Applicant respectfully asserts that the amended claims are further differentiated from Sakurai et al., JP 2002-116538 and Okazaki et al. Applicant indicates that in all of the Examples that constitute the third aspect of the subject application, (a/c) or (a/c+d) is equal to or smaller than 0.7 (that is, $(a/c) \leq 0.7$ or $(a/c+d) \leq 0.7$), and the ratio of (a) is 5 to 40% by weight.

A merit of adjusting the weight ratio (a/c) or (a/c+d) to 0.7 or less is that the curability of the coating film to be formed is sufficient, and various physical strengths such as the adhesiveness become suitable (page 137, lines 23-26). Further, the content of the copolymer (a) in the range of 5 to 40% by weight on a solid basis results in a suitable mechanical strength, together with the inhibition of problems

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including the uneven development, the generation of residue and the like.
Furthermore, it becomes possible to form a pattern having a desired elastic deformation modulus.

This is because adjusting the content of the copolymer (a) to 40% by weight or less results in a relative increase in the contain ratio of the compound (C) and/or the compound (d), which are both superior in the copolymer (a) in the ability of improving the cross-link density, thereby obtaining a sufficient cross-link density of the coating film after curing. On the other hand, adjusting the content of the copolymer (a) to 5% by weight or more ensures the developing property of the coating liquid and the elastic deformation modulus of the pattern thus formed (see page 132, line 21 to page 133, line 19).

Applicant respectfully emphasizes the effects resulting from the adjustment of the content of the copolymer (a) to 0.7 or less, by limiting the content of the copolymer (a) in the range of 5 to 40% by weight.

There is a description in column 7, line 25 to line 35 in Sakurai et al., explaining that the content of the compound (c) is 5 to 500 parts by weight or 20 to 300 parts by weight, based on 100 parts by weight of the alkali-soluble resin (a/c is in the range of 0.05 to 20.0 or 0.33 to 5). In the Examples of Sakurai et al., however, 60/40 (a/c)=1.5 or 50/50=1. Therefore, the amended claims are clearly differentiated from Sakurai et al. by specifying an a/c of 0.7 or less. In the Examples in Sakurai et al., the content of the copolymer (a) is in the range of 18.2 to 30% by weight, on the basis of solid content.

In paragraph 0092 of JP 2002-116538, it is described that the content of the photopolymerizable composition containing three or more polymerizable functional groups but containing no acidic functional group is in the range of 10 to 200 parts by weight, based on 100 parts by weight of the alkali-soluble resin (a/c is in the range of 0.5 to 10). In the Examples of JP 2002-116538, however, a/c is about 2.3/0.75, resulting in a calculation value that is far more than 0.7. Moreover, the content of (a) is expected to be much larger than 40% by weight, on the basis of solid content.

JP 2002-116538 discloses an alkali-soluble resin having a cyclic imide group. However, the cyclic imide group was introduced for the purpose of obtaining improved heat resistance, and the introduction was not based on the intention to increase sensitivity, cross-link density, etc., with the double bond of the cyclic imide

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group. Therefore, unlike the present invention, JP 2002-116538 has no concept of adjusting the content of the alkali-soluble resin (a) or the ratio of (a) to (c) for imparting a sufficient cross-link density to the cured coating film so that the film is allowed to show a suitable mechanical strength, or for obtaining a coating liquid with a desired developing property or a pattern with a desired elastic deformation modulus.

In either case of Okazaki et al., it is clear from the description of its specification that a/c is in the wide range of 5/95 to 95/5 (that is, 0.05 to 19), and in Examples disclosed in Okazaki et al., however, the value of a/c is not clear. That is, in Okazaki et al., there is no teaching to control a/c to 0.7 or less. The content of (a) in the Examples in Okazaki et al. is expected to be 20 to 25, on the basis of solid content (see Table 2).

The main applications of the compositions according to Okazaki et al. are inks, paints or the like, which is required to have weather resistance, while the main applications of the composition of the present invention are pixels or spacers for color filters. Okazaki et al. and the present invention require completely different properties. Therefore, unlike the present invention, Okazaki et al. has no concept of adjusting the content of the alkali-soluble resin (a) or the ratio of (a) to (c) for imparting a sufficient cross-link density to the cured coating film so that the film is allowed to show a suitable mechanical strength, or for obtaining a coating liquid with a desired developing property or a pattern with a desired elastic deformation modulus.

Double Patenting Rejections

Claims 1, 2 and 19-32 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over Claims 7-22 of US 7,399,574 in view of Sakurai et al. for the reasons of record. Applicant respectfully disagrees with this rejection. However, solely in the interest of advancing prosecution, Applicant has filed a terminal disclaimer herewith, limiting patent term on a patent that would allow from the present application to the maximum allowable patent term of US 7,399,574. In the making the above disclaimer, the owner does not disclaim the terminal part of any patent granted on the instant application that would extend to the expiration date of the full statutory term as defined in 35 U.S.C. 154 to 156 and 173 of the prior patent.

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In light of the foregoing response, all the outstanding objections and rejections are considered overcome. Applicant respectfully submits that this application should now be in condition for allowance and respectfully requests favorable consideration.

Respectfully submitted,

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Date

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